



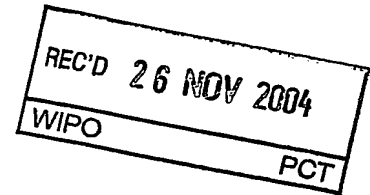
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Reclosable rigid container and package made therefrom

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RECLOSABLE RIGID CONTAINER AND PACKAGE MADE THEREFROM

The present invention relates to a container assembly and to the reclosable hermetically sealed package obtained therefrom.

5

BACKGROUND OF THE INVENTION

Hermetically sealed rigid containers, such as trays with a flexible lid sealed around their edges, are widely used in the packaging of food products. This type of packaging offers several advantages: the rigidity of the container provides protection to the contents of the package during transportation, storage and handling, and the hermeticity of the seals contributes to the increase in the shelf-life of the product. In many cases the packaged product is not immediately consumed after opening of the package, forcing the consumer to time-consuming repackaging operations. A reclosable package would therefore be very convenient. Several attempts have been made in the past to provide reclosable rigid packages. For instance the following can be mentioned: EP-A-1,140,654, EP-A-1,190,958, FR 1,499,662, GB 1,173,765, EP-A-868,368, US 5,651,462, WO 97/17264, WO 99/19226. The reclosable packages disclosed in the documents cited above have the disadvantage of either being difficult to reseal and/or consisting of separate parts that require several steps to be assembled, making the whole process cumbersome and costly.

20

A first objective of the present invention is therefore to provide a rigid container assembly for the packaging of food products which is reclosable and easy to use. Another objective is to provide a method of packaging a food product in the rigid container assembly to obtain a reclosable package. A further objective of the present

invention is to provide a reclosable package comprising the rigid container assembly and a hermetically sealed lid.

SUMMARY OF THE INVENTION

A first object of the present invention is a rigid container assembly comprising
5 an open-top receptacle portion and a frame portion, wherein the receptacle portion comprises a base and sidewalls upwardly projecting from the periphery of the base ending in a continuous flange outwardly extending from the receptacle, and the frame portion is shaped at its edge to cooperate with the flange of the receptacle to releasably secure the frame portion onto the receptacle, the frame portion not
10 extending over the whole surface of the flange, thus leaving an area of said surface continuously extending around the perimeter of the flange not covered by the frame portion.

A second object of the present invention is a method of packaging a food product in a rigid container assembly of the first object comprising the steps of:
15 providing the container with the frame portion in the closed state and a product loaded in the container, placing a thermoplastic film over the container assembly and the product and sealing the film on the frame portion of the assembly and on the part of the flange of the receptacle portion of the assembly not covered by the frame portion.

A third object of the present invention is a package comprising a rigid
20 container assembly of the first object, a product loaded therein and a thermoplastic film sealed on the frame portion of the assembly and on the part of the flange of the

These and other objects, advantages, and features of the invention will be more readily understood and appreciated by reference to the detailed description of the invention and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

- 5 Fig. 1 is a perspective view of a container assembly according to one embodiment of the present invention in the open state;
- Fig. 2 is a section of the container assembly of Fig. 1 in the closed state;
- Fig. 3 shows two further embodiments of the container assembly of the present invention shown in the closed state;
- 10 Fig. 4 is a top view of the container assembly in the open state, where both the frame portion and the flange of the receptacle portion are provided with tabs;
- Fig. 5 is a section of a package of the present invention in the closed state;
- Fig. 6 is an enlargement of the circled portion of Figure 5;
- Fig. 7 is a schematic view of the sealing step of the packaging method according to
- 15 the present invention;
- Fig. 8 is a perspective view of a package of the present invention in the open state.

DETAILED DESCRIPTION OF THE INVENTION

With reference to Fig. 1 and 2, which represent one embodiment of the rigid container assembly of the present invention in the open and closed state respectively, container assembly 10 comprises a receptacle portion 20 and a frame portion 30 connected by hinge 40. Receptacle portion 20 comprises a flat bottom wall 24 and upwardly extending sidewalls 25. Flange 21 extends outwardly from sidewalls 25 with a horizontal surface 26 and downwardly, forming skirt 27 which extends around the sidewalls of the receptacle. Horizontal surface 26 of the flange includes an inner upper step part 22 and an outer lower step part 23. Skirt 27 is conventionally shaped at its edge to cooperate with frame portion 30 so that the frame can be snap-fit closed onto receptacle 20. Frame portion 30 includes flat rim 32 and skirt 31, which is shaped to engage with skirt 27 on the receptacle portion when the container assembly is in the closed state.

The width of rim 32 is not greater than the width of outer lower step part 23 of flange 21, so that, when the container assembly is in the closed state, rim 32 does not extend over the inner upper step part 22 of the horizontal surface 26 of flange 21.

In another embodiment of the present invention, shown in Fig. 3A, flange 21 of receptacle portion 20 extends outwardly from the sidewalls 25 with horizontal surface 26 and downwardly, forming skirt 27 which extends around the sidewalls of the receptacle. Horizontal surface 26 of the flange is flat and skirt 27 is shaped at its edge to cooperate with frame portion 30. Frame portion 30 includes a flat rim 32 and

thereby leaving the remaining part 22a of the horizontal surface uncovered. In Fig. 3A, portion 23a represents about 50% of the total extension of flange 26.

In still another embodiment of the present invention, shown in Fig. 3B, flange 21 extends outwardly from sidewalls 25 with horizontal surface 26. Horizontal surface 26 includes an inner lower step part 23b and an outer upper step part 22b. The outer upper step part is shaped at its internal edge to cooperate with rigid frame portion 30b so that the frame can be snap-fit closed onto receptacle 20. Frame portion 30b is shaped to engage with outer upper step part 22b of the flange of the receptacle portion when the container assembly is in the closed state. The width of frame portion 30b matches the width of inner lower step part 23b of the flange 21, so that, when the container assembly is in the closed state, frame 30b snugly fits onto the flange of the receptacle.

When frame portion 30 is engaged with receptacle portion 20, as shown in Fig. 2-3, the open mouth 5 of the container assembly 10 remains unhindered and products can be as easily loaded into the receptacle as they would be in any conventional tray-like container. When container assembly 10 is in the closed state it is also possible to neatly stack one assembly into the other, as generally done with tray-like containers. This offers two major advantages: the container assemblies of the present invention can be stored and shipped in a most space-efficient way and once they arrive at the packaging facility they can be handled by conventional tray loading equipment.

Bottom wall 24 of container assembly 10 can have a rectangular (as shown in Fig. 1), elliptical, square, circular or any other desired shape.

In the embodiment of the invention shown in Fig. 1-2 receptacle portion 20 and frame portion 30 are connected by one hinge 40, but more than one hinge can be present, as shown in Fig. 4. In a second embodiment of the invention, shown in Fig. 3, receptacle portion 20 and frame portion 30 are not connected by any hinge.

5 In Fig. 4 frame portion 30 and flange 21 are provided with tabs 28 and 33, respectively, which can be grasped for separating the frame portion from the receptacle.

Receptacle portion 20 and frame portion 30 of the container assembly can either be made of the same material or they can be made of different materials.

10 Suitable materials for both the receptacle and the frame portion, are single layer or multi-layer thermoplastic materials, but other materials commonly employed in food packaging could be used, such as plastic coated paperboard or cardboard. In case of a single layer structure suitable thermoplastic materials are for instance polystyrene, polypropylene, polyesters, high density polyethylene, poly(phenylene
15 oxide), poly(lactic acid), PVC and the like, either foamed or solid. In case of a multi-layer structure suitable materials are for instance ethylene homo- and co-polymers, propylene homo- and co-polymers, polyamides, polystyrene, polyesters, poly(lactic acid), PVC and the like. Part of the multi-layer structure can be solid and part can be foamed.

20 In one embodiment receptacle 20 and frame 30 are made of the same multi-layer thermoplastic material comprising at least one support layer, one oxygen barrier

μm , preferably between 300 and 1,000 μm . The oxygen barrier layer comprises any of the polymers known in the art for their oxygen barrier properties, such as (ethylene-co-vinyl alcohol) copolymers, polyvinylidene chloride and polyamides. The thickness of the oxygen barrier layer will be set in order to provide the overall laminate with an

5 Oxygen Transmission Rate (evaluated by following the method described in ASTM D-3985 and using an OX-TRAN instrument by Mocon) at 23°C and 100% of relative humidity that it is lower than 250, preferably lower than 150 and even more preferably lower than 100 $\text{cc}^3/\text{m}^2 \cdot \text{d} \cdot \text{atm}$. Typically when (ethylene-co-vinyl alcohol) copolymers and polyvinylidene chloride are used as the oxygen barrier materials this

10 is achieved with barrier layers 3-8 μm thick. The heat-sealable surface layer comprises materials chosen from the group of ethylene homo- and co-polymers, propylene homo- and co-polymers, ionomers and the like as well as blends of these polymers in any proportions. Suitable blends for the heat-sealable layer also include peelable blends. The thickness of the heat-sealable surface layer is typically

15 comprised between 5 and 80 μm , more preferably from about 8 to about 50 μm .

Additional layers can be present such as tie or adhesive layers, bulk layers and the like.

In another embodiment receptacle portion 20 and frame portion 30 are made of the same single layer material, chosen from the group of cast polyesters,

20 polypropylene, PVC and the like.

Receptacle portion 20 and frame portion 30 of the container assembly can be moulded by any technique known in the art, such as thermoforming, injection moulding, hot stamping, compression moulding and the like. They can be moulded

either at the same time in a one-step operation starting from the same material or separately from the same or different materials.

A second object of the present invention is a method of packaging a food product in the rigid container assembly 10, comprising the steps of:

- 5 — providing container assembly 10 with frame portion 30 engaged with receptacle portion 20, and a product 80 loaded therein;
- placing a web of thermoplastic film 60 over the container assembly 10 and product 80;
- optionally evacuating and /or gas flushing with a suitably selected purging gas
- 10 or gas mixture; and
- sealing film 60 on rim 32 of the frame portion and on the part 22 of flange 21 of the receptacle portion of the assembly not covered by rim 32.

Container assembly 10 can be formed by engaging frame portion 30 onto receptacle portion 20 after or, more preferably, before the product to be packaged is

15 loaded into the receptacle. In the latter case this can be done right before the packaging operations take place or, more preferably, by the supplier of container assembly 10 at his own production facility.

In a preferred embodiment of the present invention the packaging method comprises the steps of:

- 20 — providing container assembly 10 with the frame portion in the closed state;
- placing a product 80 in the container through open mouth 5;

- optionally evacuating and /or gas flushing with a suitably selected purging gas or gas mixture; and
- sealing film 60 on rim 32 of the frame portion and on part 22 of flange 21 of the receptacle portion of the assembly not covered by rim 32.

5 In more details, container assembly 10 with the frame portion in the closed state is placed in a container-like countersupport present in a suitable tray-lidding machine.

 The product to be packaged is loaded into the container through the open mouth 5 either manually or by means of a tray loading apparatus. Thermoplastic film 60 is then positioned over container assembly 10 and product 80 generally by means of at
10 least a pair of rolls: an unwind roll and a take-up roll. Different types of thermoplastic film are known and may be suitably employed depending upon the container contents and the desired characteristics of the final package. Also depending on the nature of the product to be packaged it may be desirable to modify the atmosphere inside container assembly 10 before sealing thermoplastic film 60. The atmosphere can be
15 modified either by simply flushing receptacle portion 30 with a suitable gas or gas mixture or by firstly evacuating receptacle portion 30 and then back-filling with a suitable gas or gas mixture. The gas or the gas mixture are selected to maximize the shelf-life of the product being packaged. Preferred gases to replace evacuated air include carbon dioxide, nitrogen, argon and mixtures thereof. Once this step has been
20 completed, thermoplastic film 60 is then sealed over container assembly 10. When the atmosphere inside the package is modified with respect to air thermoplastic film 60 is preferably chosen to have a low permeability to gases in order to maintain the atmosphere inside the package unchanged for the whole shelf-life of the product.

In the method of the present invention, thermoplastic film 60 forms a first seal 61 with rim 32 of the frame portion and a second, peelable seal 62 with part 22 of the flange of the receptacle not covered by rim 32, as shown in Fig. 5. As used herein the term "peelable seal" refers to a seal which is strong enough to guarantee the hermeticity of the package during its life-cycle but which can be easily opened by peeling apart by hand the two materials that were joined by the seal. The force required to peel the two layers away is usually referred to in terms of "peel force". A method of measuring the peel force is described in ASTM F-88-00. Acceptable peel force values for peelable seals usually range from 1,900 g/25 mm to 700 g/25 mm.

10 The force required to peel thermoplastic film 60 from the container assembly at seal 61 can be comparable to, or preferably higher than the force required to peel thermoplastic film 60 from the container assembly at seal 62. When the peel force is comparable, it will be possible to promote the opening of the package without affecting seal 61 between thermoplastic film 60 and frame 30 by selecting for the assembly 10 a configuration as the one shown in Fig. 1-2, where seal 61 is less solicited during the opening and closing operations than is seal 62.

In one embodiment of the method of the present invention seal 61 is a permanent seal, that is a seal that can not be opened without causing the physical destruction of at least one of the materials joined by the seal. Several methods can be employed to form a permanent seal 61 and a peelable seal 62 between thermoplastic film 60 and container assembly 10.

The container assembly 10 is shown in Fig. 1, receptacle portion 22 and frame portion 30 are

thermoplastic film 60 is joined to the container assembly 10 by a seal 61

and a seal 62 between the thermoplastic film 60 and the container assembly 10.

which is the food contact layer. Heat-sealable surface layer 201 of thermoplastic film 60 is suitably chosen to form a permanent seal with the outer layer 102 of the laminate and a peelable seal with inner heat-sealable layer 101 of the laminate. As an example, container assembly 10 is obtained from a laminate having at least one outer layer 102
5 made of propylene homo- or co-polymers and one inner heat-sealable layer 101 which gives peelable seals with polyolefins. Suitable materials for heat-sealable layer 101 are for instance Steripeel® WD165CF and Borpeel® WD255CF both sold by Borealis, those sold by DuPont under the trade-name Appeel®, ternary blends comprising polybutylene, LDPE and LLDPE and the like. Preferably, the heat-sealable surface of
10 film 60 is made of propylene co-polymers, ethylene co-polymers or blends thereof.

In another method of the present invention, the area of the flange of the receptacle not covered by the rim of the frame portion is embossed so that, regardless of the compatibility between the sealing surface of film 60 and the inner heat-sealable layer of container assembly 10, the seal in the roughened surface will be easily openable.

15 In still another method of the invention, the sealing frame of the packaging machine is formed by two separate concentric frames: the frame sealing thermoplastic film 60 onto the rim of the frame portion operating at a temperature and/or pressure selected to produce a strong seal 61 and the frame sealing thermoplastic film 60 onto the area of the flange not covered by rim 32 operating at a lower temperature and/or
20 pressure, therefore making a weaker, easy to open seal 62.

The packaging method of the invention can be performed on currently available tray lidding machines, either automatic or manual, commercially supplied by, e.g., Ross Industries, Inc., Multivac, Inc. or Mondini S.p.A. with only minor modifications.

Specific examples of suitable models include the Multivac T550 or the Mondini Evoluzione Super.

In this type of machines sealing of the thermoplastic film onto the sealing surface of the receptacle is carried out by means of a sealing frame, which forms a continuous seal around the perimeter of the sealing surface of the receptacle. Sealing can be accomplished by any method known in the art, for instance by hot-bar, impulse, RF etc.

In one embodiment of the present invention, shown in Fig. 7, the sealing section of sealing frame 70 is at least as wide as the horizontal surface 26 of the flange, so that a continuous seal can be formed between the thermoplastic film and both the rim 32 of the frame portion and the inner upper step part 22 of flange 21. The sealing section of sealing frame 70 can have a flat profile with square edges, as shown in Fig. 7, or any other suitable profile, such as flat with rounded edges, step-like etc. As an alternative, sealing frame 70 can be formed by two separate concentric frames: one for sealing thermoplastic film 60 onto rim 32 of the frame portion and one for sealing thermoplastic film 60 part 22 of the flange of the receptacle not covered by rim 32.

Thermoplastic film 60 may be cut to the desired size at any time, prior to, during or after it is sealed to container assembly 10, forming film portion 63 which is secured to the assembly by means of seals 61 and 62. In a preferred method cutting is accomplished immediately after sealing by means of a cutting frame which encircles sealing frame 70, but any other suitable method can be employed.

etc. In case of a single layer structure suitable polymeric materials are for instance ethylene homo- and co-polymers, propylene homo- and co-polymers, ionomers, polyamides, polyesters, polystyrene, poly(lactic acid) and the like. In case of a multi-layer structure suitable materials for the layer that will be sealed to the container assembly (the heat-sealable layer) are as indicated above. In both cases to obtain hermetic seals thermoplastic film 60 or its heat-sealable layer, in case of a multi-layer structure, must be selected to have a certain degree of chemical compatibility with the surface of container assembly 10. Film 60 can be either oriented or non-oriented and in the former case it can be either heat-shrinkable or non heat-shrinkable.

10 In one embodiment of the present invention thermoplastic film 60 is substantially impermeable to oxygen, that is it has an Oxygen Transmission Rate (evaluated by following the method described in ASTM D-3985 and using an OX-TRAN instrument by Mocon) at 23°C and 0% of relative humidity that is lower than 200, preferably lower than 150 and even more preferably lower than 80 cc³/m².d.atm. This
15 can be achieved by using a polymeric material which has oxygen barrier properties such as (ethylene-co-vinyl alcohol) copolymers, polyvinylidene chloride and polyamides. In one preferred aspect of said embodiment thermoplastic film 60 comprises at least one heat-sealable surface layer, one oxygen barrier layer and one outer heat-resistant layer, wherein the outer heat-resistant layer is made, for instance,
20 from materials chosen from the group of polypropylene, polyethylene, polyesters and polyamides. In another embodiment of the present invention thermoplastic film 60 is substantially permeable to oxygen. For instance, film 60 may comprise one outer heat-resistant layer of a high melting polyester and one heat-sealable surface layer of a low melting polyester.

A third object of the present invention is a package obtained from container assembly 10. With reference to Fig. 5 and 8, which represent one embodiment of the package of the present invention in the closed and open state respectively, package 90 comprises a rigid container assembly 10, a product 80 loaded therein and a
5 thermoplastic film 60 sealed on rim 32 of the frame portion and on part 22 of the flange of the receptacle portion of the assembly not covered by rim 32. Film 60 forms seal 61 with the frame portion and a peelable seal 62 with the inner upper step part of the flange of the receptacle.

Package 90 can be opened by disengaging frame portion 30 from flange 21,
10 peeling seal 62 and lifting frame portion 30 away from receptacle portion 20. As shown in Fig. 8, once peelable seal 62 has been opened, portion 63 of thermoplastic film 60 remains secured to frame portion 30 by means of seal 61 thus forming a unitary, self-standing lid 35. Lid 35 can be used to reclose package 90, providing optimal storage conditions for product 80 even after the package has been opened.

15 The container assembly of the invention offers a simple and economical solution to the problem of providing reclosable containers. In fact, by simply sealing a thermoplastic film over the container assembly of the invention, it is possible to obtain a package which is hermetically sealed during the distribution and sale cycle, that can be easily opened and that can be repeatedly closed. Furthermore the present
20 invention allows to reduce the amount of plastic material employed, eliminating the need of a separate lid placed on top of a hermetically sealed thermoplastic film.

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1. A rigid container assembly 10 comprising an open-top receptacle portion 20
and a frame portion 30 wherein the receptacle portion 20 comprises a base 24
5 and upwardly projecting sidewalls 25 from the periphery of the base ending in
a continuous horizontal flange 21 outwardly extending from the receptacle,
and the frame portion 30 is shaped at its edge to cooperate with part of the
flange so that the frame can be releasably secured onto receptacle portion, and
wherein the frame portion 30 does not extend over the whole surface of the
10 flange, thus leaving an area 22 of said surface, continuously extending around
the perimeter of the flange, not covered by frame portion 30.
2. A container assembly 10 according to claim 1 wherein the flange 21 of the
receptacle portion 20 includes an inner upper step part 22 and an outer lower
step part 23, and the frame portion 30 is shaped at its edge to cooperate with
15 the outer lower step part of the flange and wherein the frame portion does not
extend over the inner upper step 22 part of the flange.
3. A container assembly 10 according to claim 1 wherein receptacle portion 20
and frame portion 30 are connected by at least one hinge 40.
4. A container assembly 10 according to claims 1 to 3 wherein said assembly
20 consists of one or more layers of a thermoplastic material chosen from the
group comprising polyolefins, polyamides, polyesters, polystyrene, high
density polyethylene, PVC, poly(lactic acid).
5. A method of packaging a food product in a rigid container assembly
comprising the steps of:

- providing a container assembly 10 according to claim 1 with the frame portion 30 in the closed state and a product 80 loaded therein;
- placing a thermoplastic film 60 over container assembly 10 and product 80;
- 5 — optionally evacuating and /or gas flushing with a suitably selected purging gas or gas mixture; and
- sealing film 60 on the frame portion 30 of the assembly and on the part 22 of the flange of the receptacle portion of the assembly not covered by the frame portion 30.

10 6. A method of packaging a food product in a rigid container assembly comprising the steps of:

- providing a container assembly 10 according to claim 1 with frame portion 30 in the closed state;
- placing a product 80 in the container through the open mouth 5;
- 15 — placing a thermoplastic film 60 over the container assembly 10 and product 80;
- optionally evacuating and /or gas flushing with a suitably selected purging gas or gas mixture; and
- sealing film 60 on the frame portion 30 of the assembly and on the part 22 of the flange of the receptacle portion of the assembly not covered
- 20 by the frame portion 30.

assembly 10 and a peelable seal 62 with the part 22 of the flange of the receptacle not covered by the frame portion 30.

8. A package comprising a rigid container assembly 10 according to claim 1, a product 80 placed therein and a thermoplastic film 60 sealed on the frame portion 30 of the assembly and onto part 22 of the flange of the receptacle not covered by the frame portion 30.
9. A package according to claim 8 wherein the thermoplastic film 60 forms a permanent seal 61 with the frame portion 30 and a peelable seal 62 with the part 22 of the flange of the receptacle not covered by the frame portion 30.

10

ABSTRACT OF THE DISCLOSURE

There is described a rigid container assembly 10 for the packaging of food products. The container assembly 10 comprises a receptacle portion 20 and a frame portion 30. Receptacle portion 20 comprises a flat bottom wall 24, upwardly
5 extending sidewalls 25 and flange 21 which extends outwardly from sidewalls 25 with a horizontal surface 26 and downwardly, forming skirt 27 which extends around the sidewalls of the receptacle. Flange 21 is shaped to cooperate with frame portion 30 so that the frame can be snap-fit closed onto receptacle 20. Frame portion 30 includes flat rim 32 and optionally skirt 31, which is shaped to engage with skirt 27 on the
10 receptacle portion when the container assembly is in the closed state. Rim 32 does not extend over the whole surface 26 of flange 21 leaving part 22 of the flange uncovered.

Also described is a method of packaging a food product and a package obtained by sealing a thermoplastic film 60 on rim 32 of the frame portion of the assembly and on the part 22 of the flange of the receptacle portion of the assembly not
15 covered by rim 32, wherein the film forms a first seal 61 with the frame portion and a peelable 62 seal with part 22 of the flange of the receptacle.

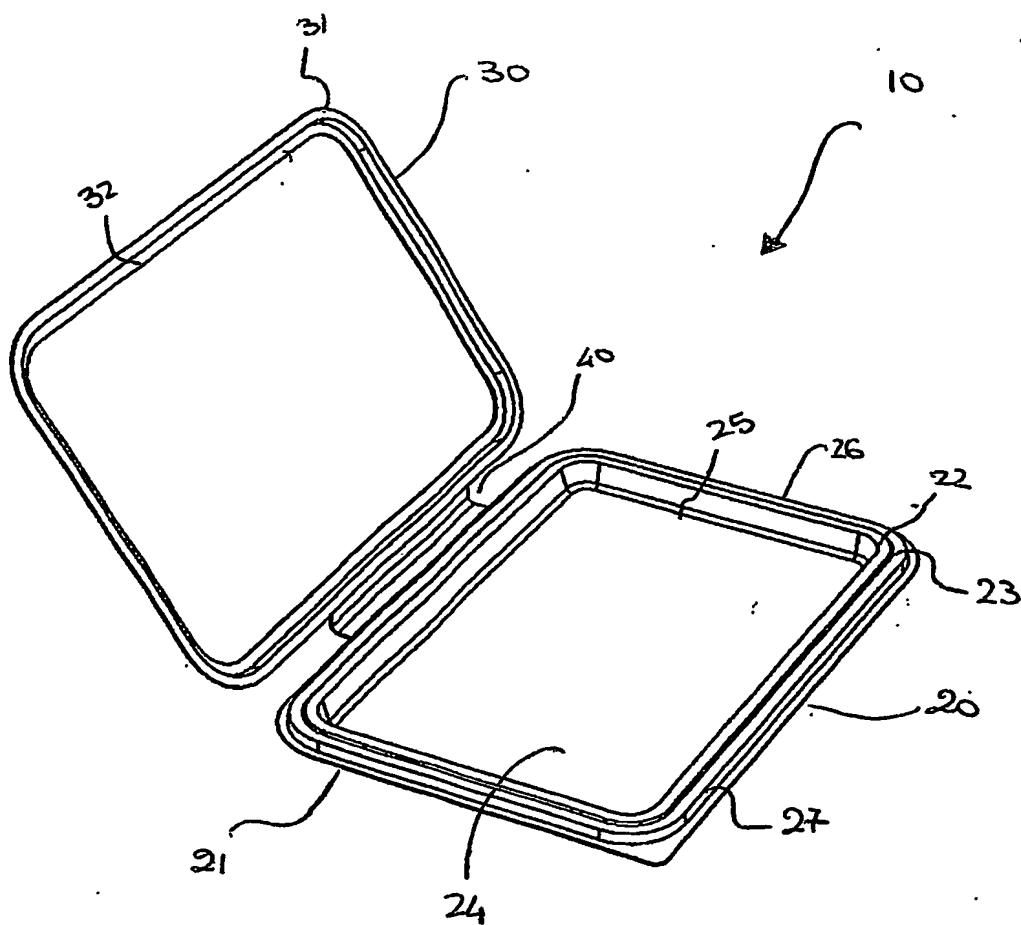


FIG. 1

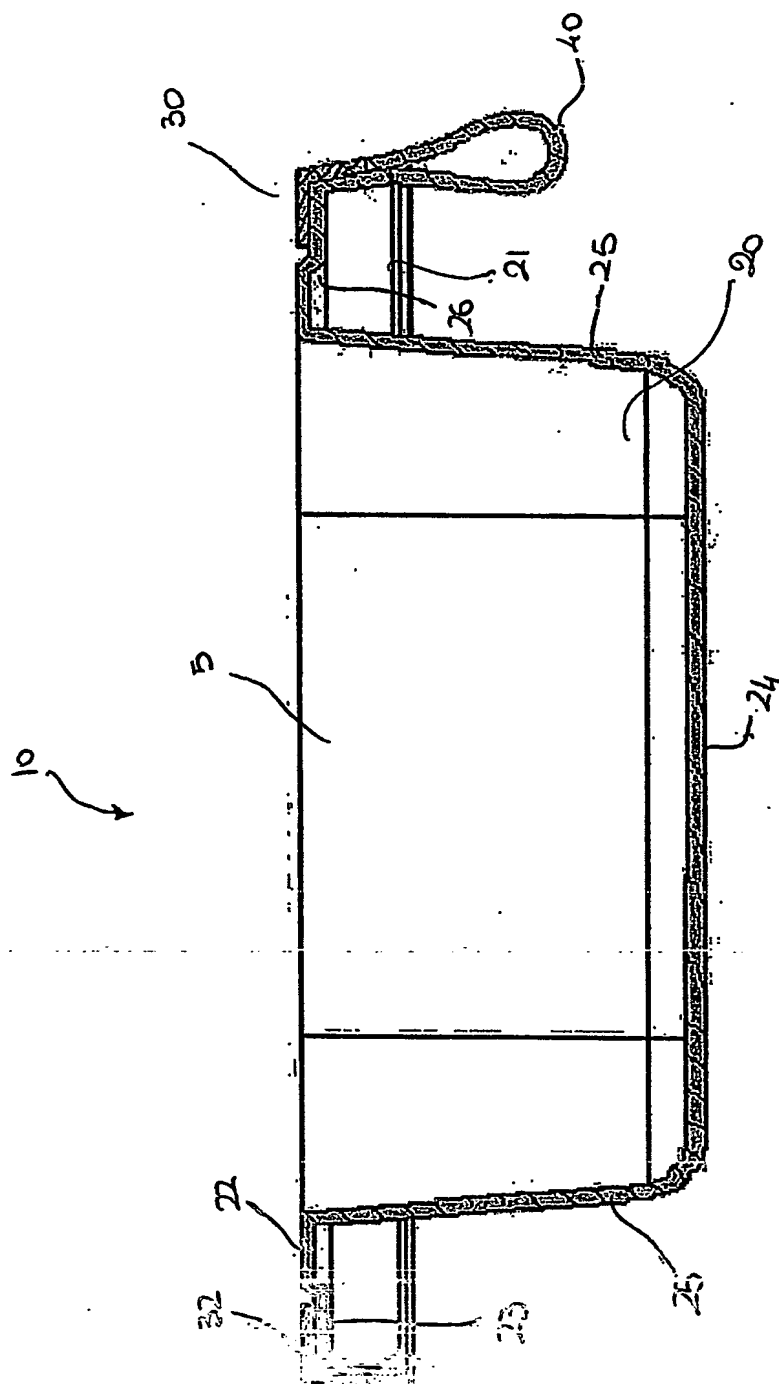


FIG. 2

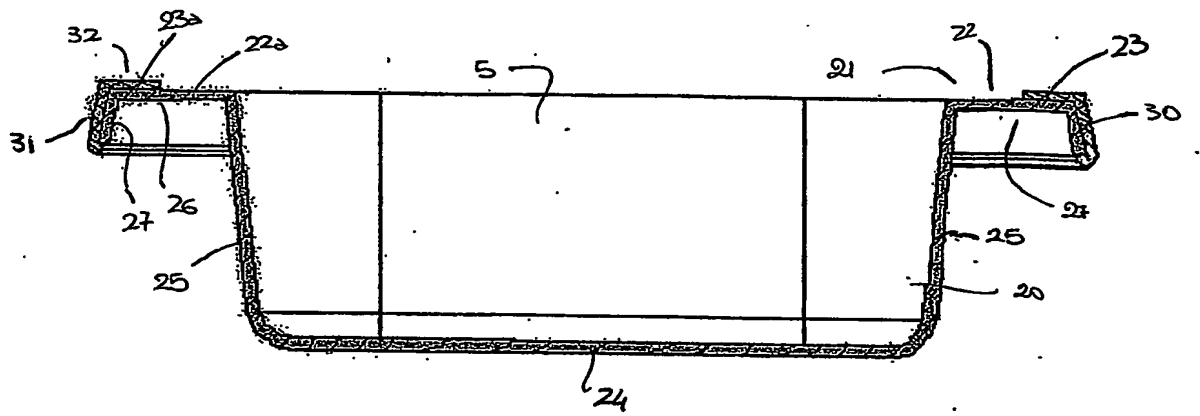


FIG. 3A

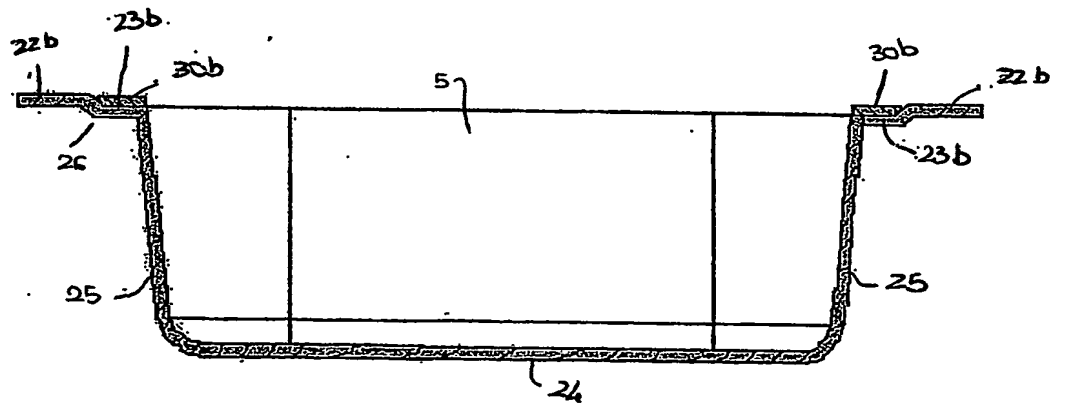


FIG. 3B

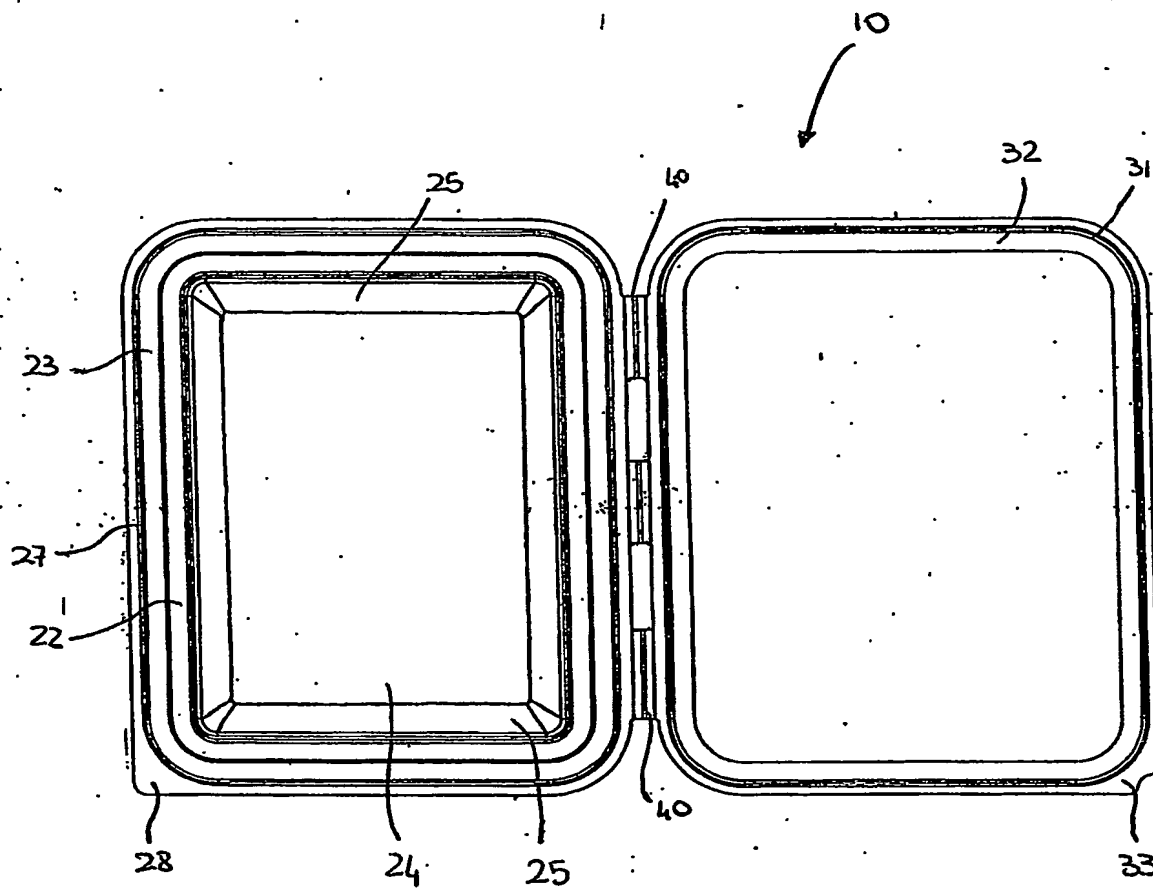


FIG. 4

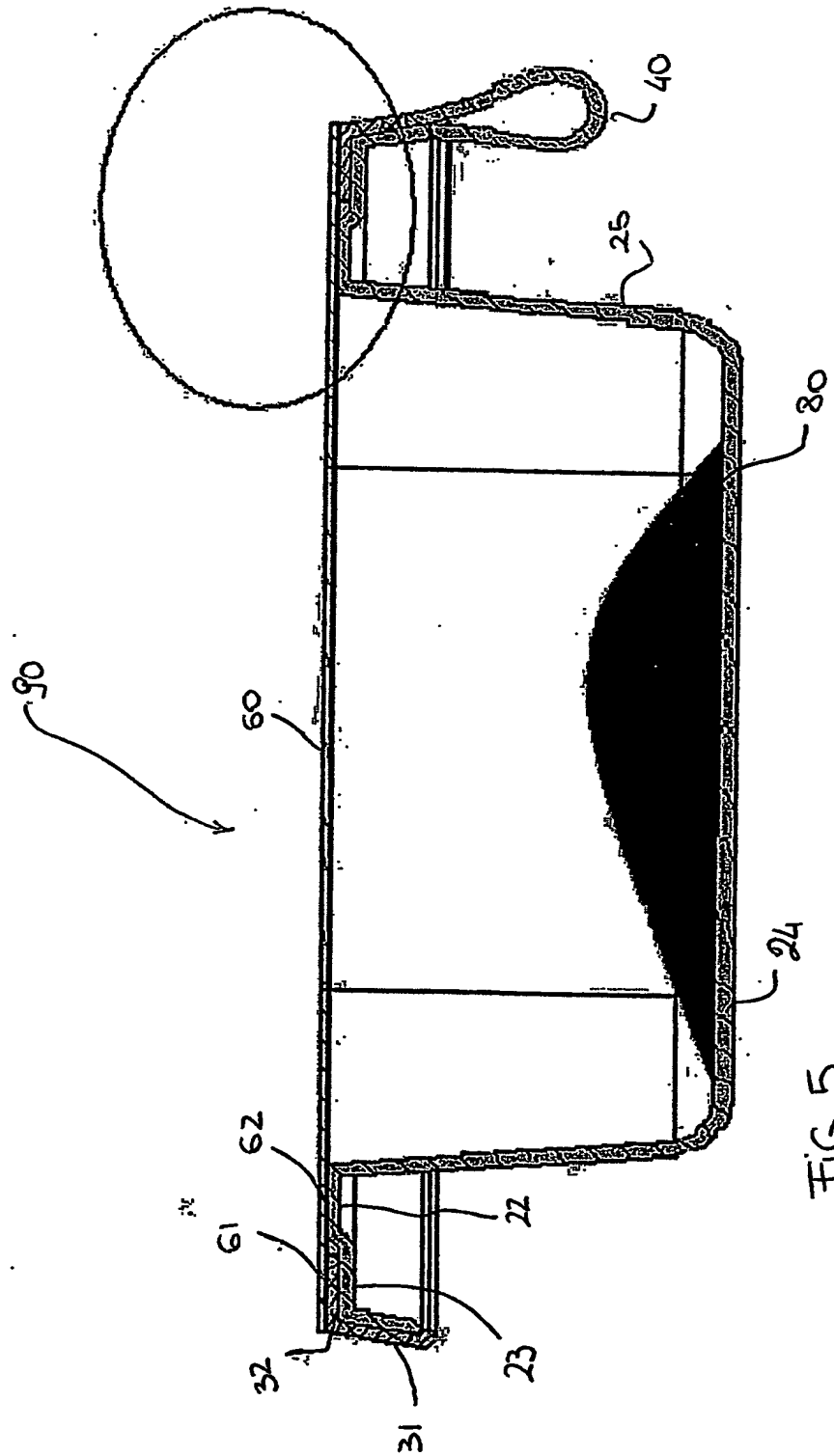


FIG. 5

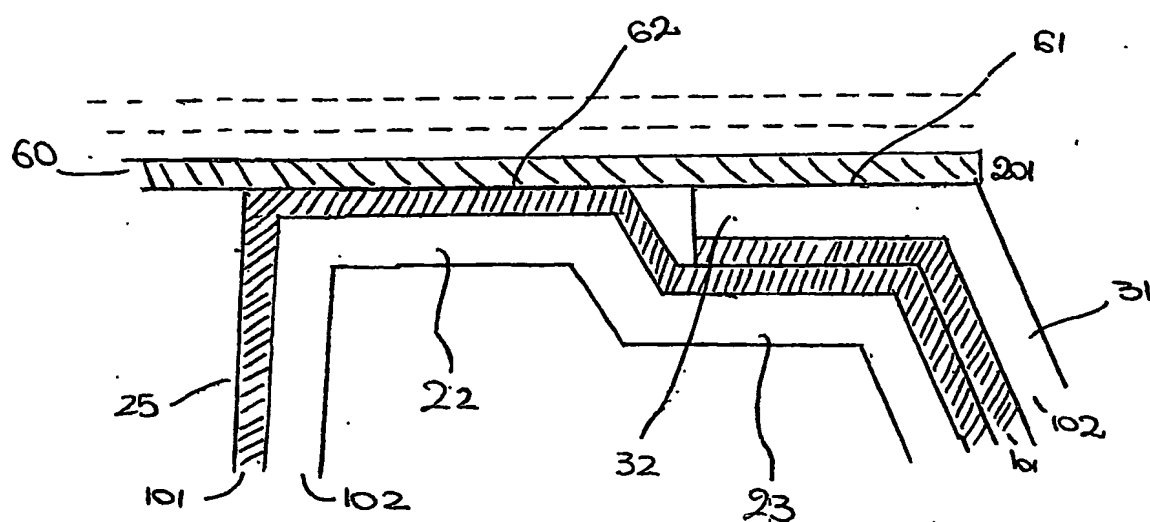


FIG. 6

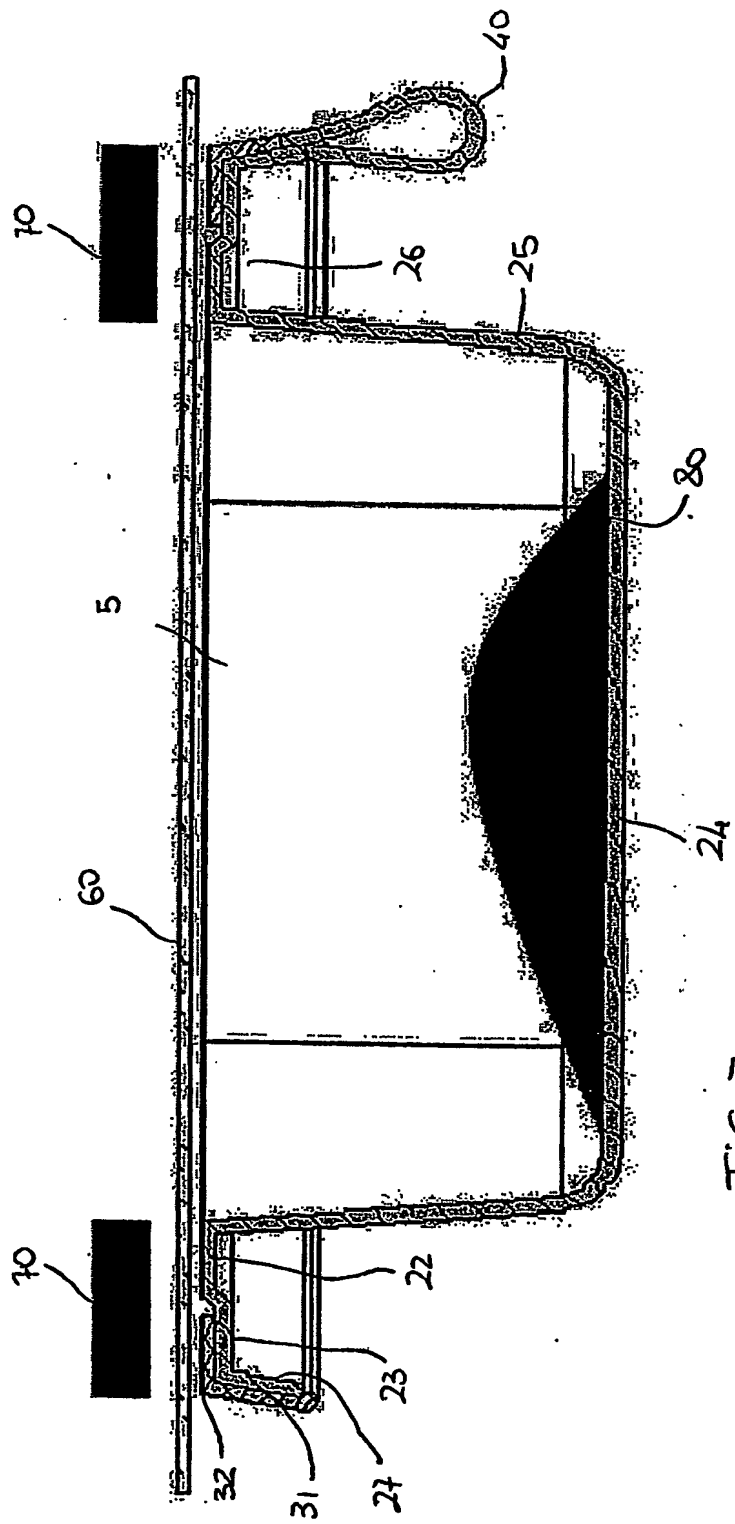


FIG. 7

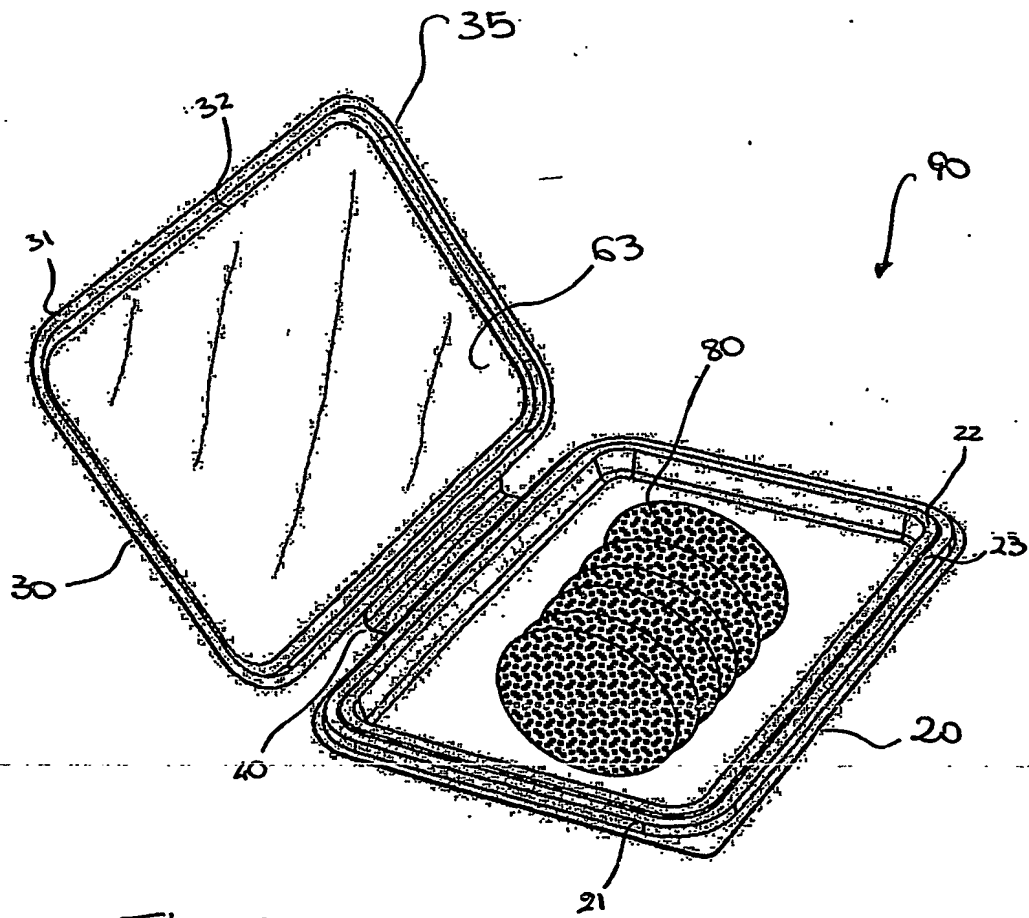


FIG. 8

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